Lecture Notes

A Complex Systems Approach to Injury Prevention Research

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Injury prevention – an economic argument

Professional leagues

In 2015 the following was spent on salaries for injured players

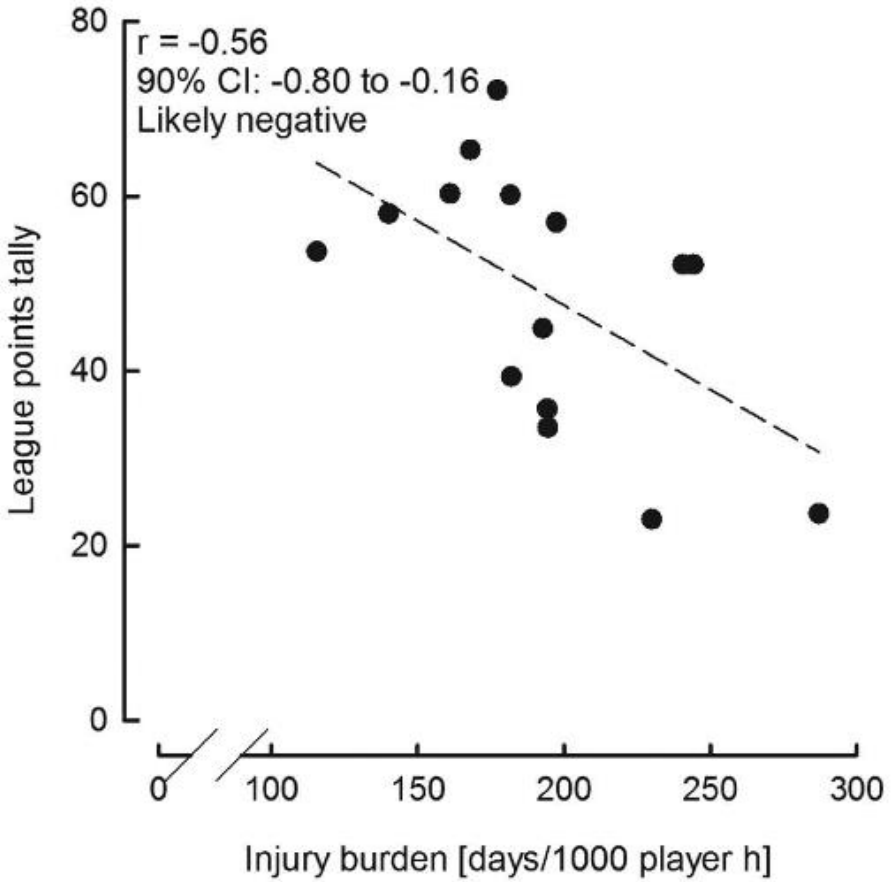
- Major League baseball - $700 million
- NFL - $450 million
- NBA - $350 million
- English Premier League - $300 million

Amateur players

Significant personal financial and social burden of injury

- $ 731 per injury in amateur rugby
  Brown et al., J Sci Med Sport, 2015
- €58 due to healthcare utilization and €116 due to missed work
  Hespanol Junior et al., Scand J. Med Sci, 2015

Injury vs. Performance



Williams et al., BJSM, 2015

Similar results in

- Football
  (Hagglund et al., BJSM, 2013
- Track and Field
  (Raysmaith and Drew, J Sci Med Sport, 2016)
- Basketball
  (Podlog et al., J Sci Med Sport, 2013)

Systematic review

Drew, Raysmith and Charlton, BJSM, 2013

"Injuries have a detrimental impact on team and individual athletic success."

"Injury prevention should therefore be a priority for maximising athletic performance"

Injury prevention programs are effective

Effect of specific exercise-based football injury prevention programmes on the overall injury rate in football: a systematic review and meta-analysis of the FIFA 11 and 11+ programmes

Kristian Thorborg,[1,2] Kasper Kühn Krommes,[1,3] Ernest Esteve,[4,5] Mikkel Bek Clausen,[6] Else Marie Bartels,[7] Michael Skovdal Rathleff[3,8,9]

The FIFA 11+ prevention programme reduces football injuries by 39%,

Injury prevention programs are effective

Reducing musculoskeletal injury and concussion risk in schoolboy rugby players with a pre-activity movement control exercise programme: a cluster randomised controlled trial

Michael D Hislop,[1] Keith A Stokes,[1] Sean Williams,[1] Carly D McKay,[1] Mike E England,[2] Simon P T Kemp,[2] Grant Trewartha[1]

The Activ8 prevention programme reduces rugby match injuries by 72%,

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Injury outcomes aren't improving

Hamstring injuries have increased by 4% annually in men's professional football, since 2001: a 13-year longitudinal analysis of the UEFA Elite Club injury study

Jan Ekstrand,[1,2,3] Markus Waldén,[1,2] Martin Hägglund[2,4]

On average, a professional rugby union player is more likely than not to sustain a concussion after 25 matches

James Rafferty,[1] Craig Ranson,[2] Giles Oatley,[3] Mohamed Mostafa,[4] Prabhat Mathema,[5] Tom Crick,[6] Isabel S Moore[7]

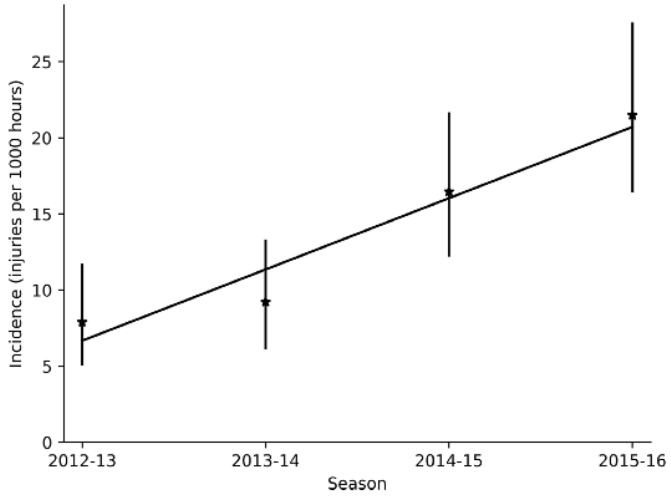

Figure 1 The match injury incidence (95% CI) of concussion in club and international rugby combined across the four seasons.

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Uptake/adoption of injury prevention programs is disappointing

Evidence-based hamstring injury prevention is not adopted by the majority of Champions League or Norwegian Premier League football teams: the Nordic Hamstring survey

Roald Bahr,[1,2] Kristian Thorborg,[3,4] Jan Ekstrand[5]

83% of clubs did not adopt the injury prevention intervention

Uptake/adoption of injury prevention programs is disappointing

The delivery of injury prevention exercise programmes in professional youth soccer: Comparison to the FIFA 11+

James O'Brien[a,*], Warren Young[a,b], Caroline F. Finch[a]

On average 1 exercise was performed in its original form, 4 were performed in modified form (out of 15 exercises)

How do we connect research with practice?

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Simple solutions don't work for complex problems?

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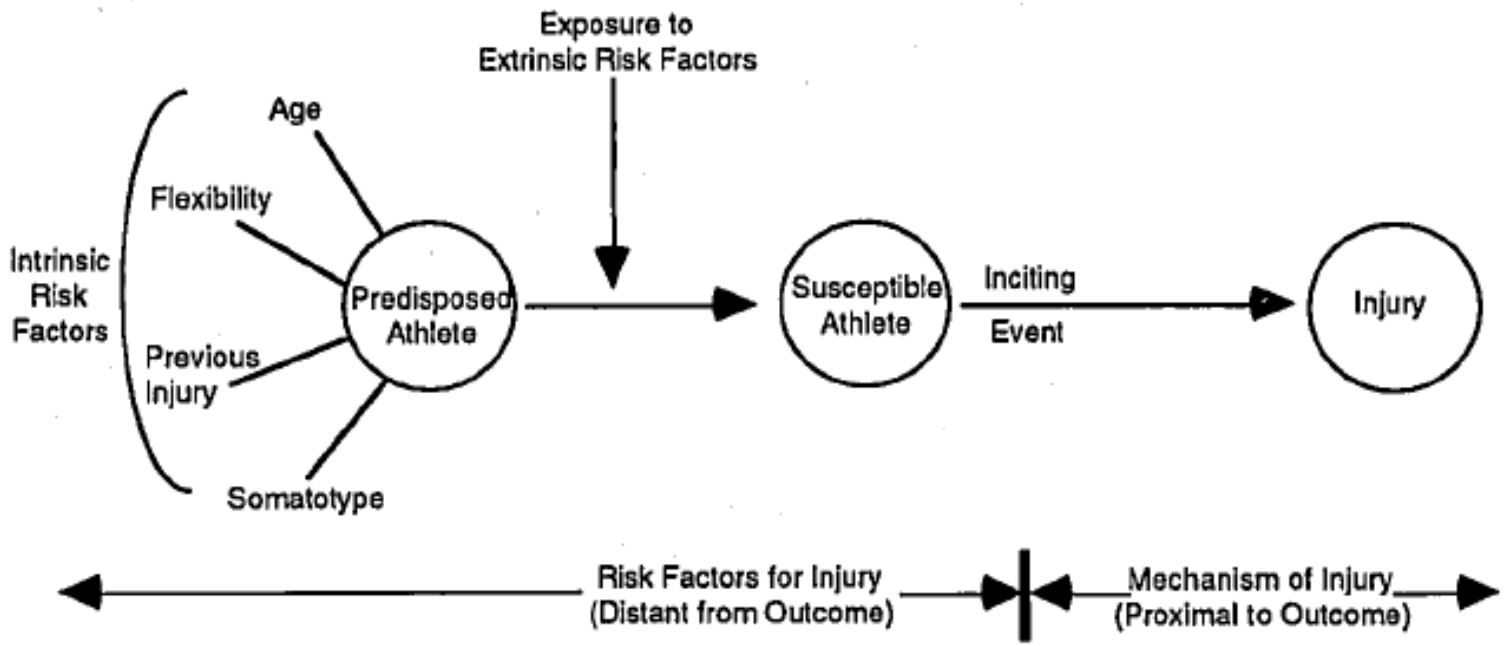
- Sheree Complexity explanation

Understanding injuries

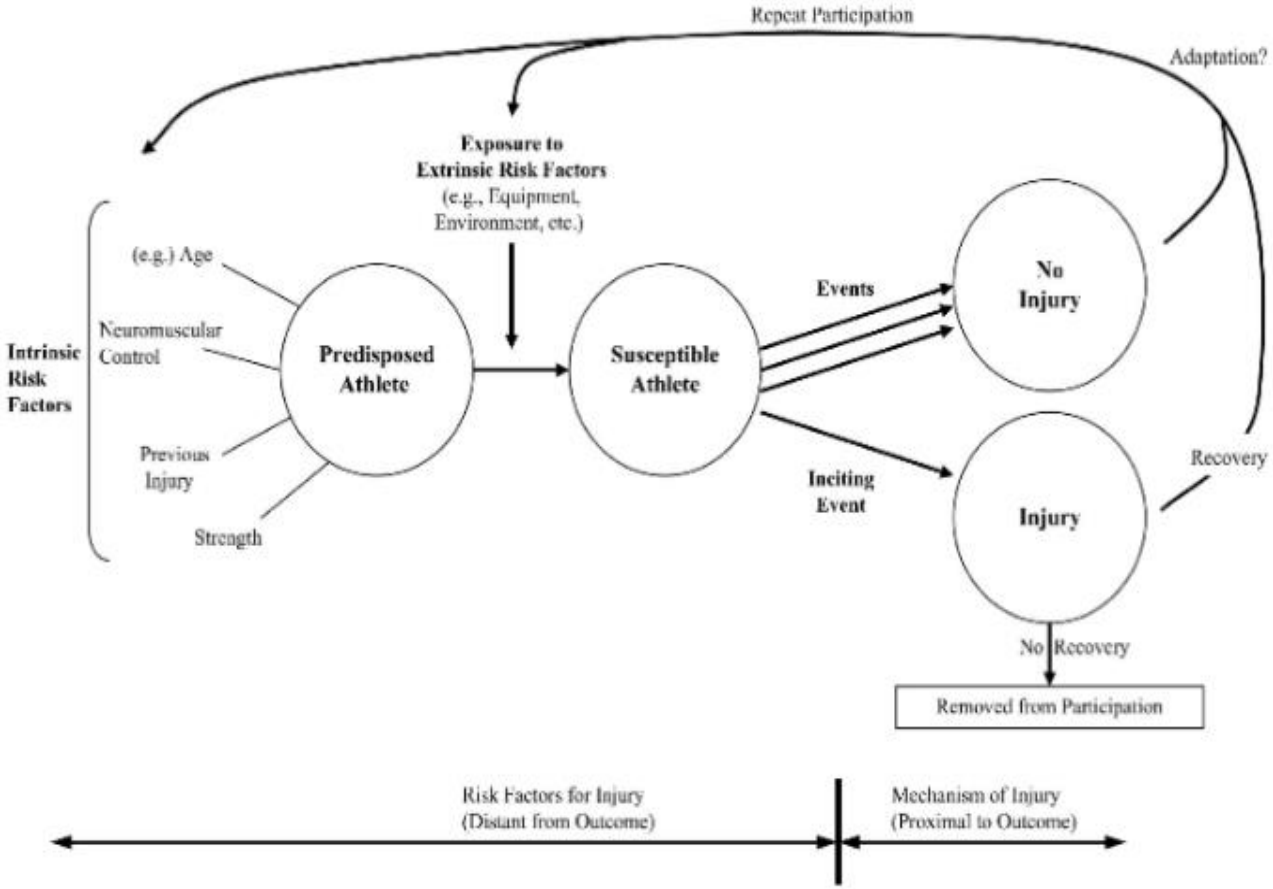
1994



Meeuwisse et. al., Clin J Sport Med, 1994

Understanding injuries

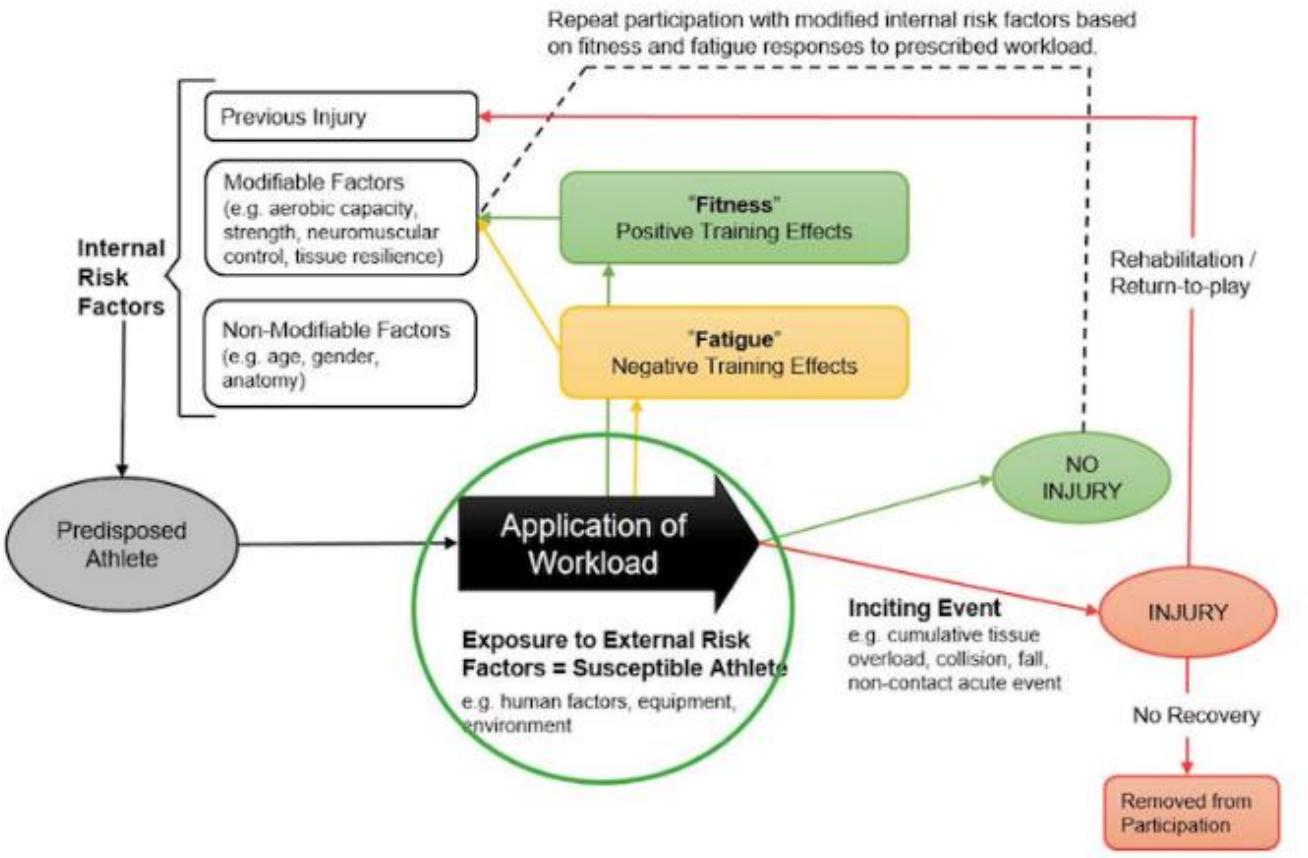
2007



Meeuwisse et. al., Clin J Sport Med, 2007

Understanding injuries

2016



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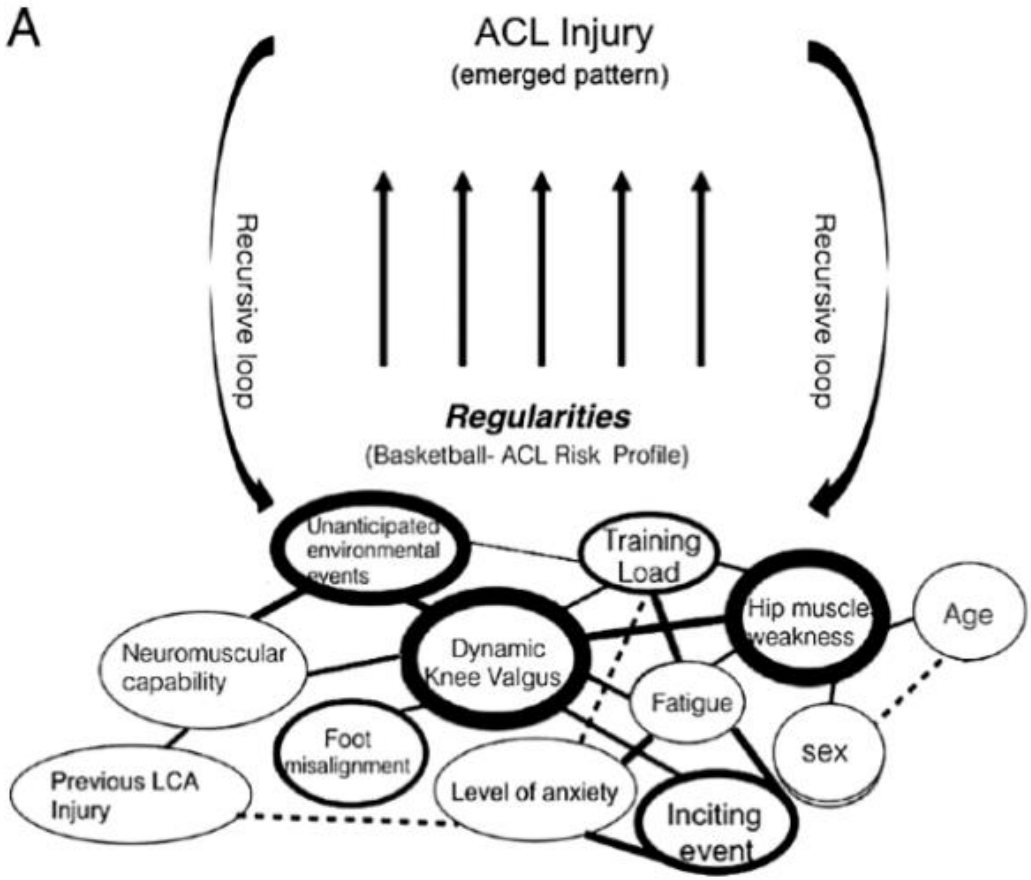
Windt and Gabbett, BJSM, 2016

Understanding injuries as a complex system

2016



Bittencourt et al., BJSM, 2016

Researching injuries

1987 – Sequence of prevention

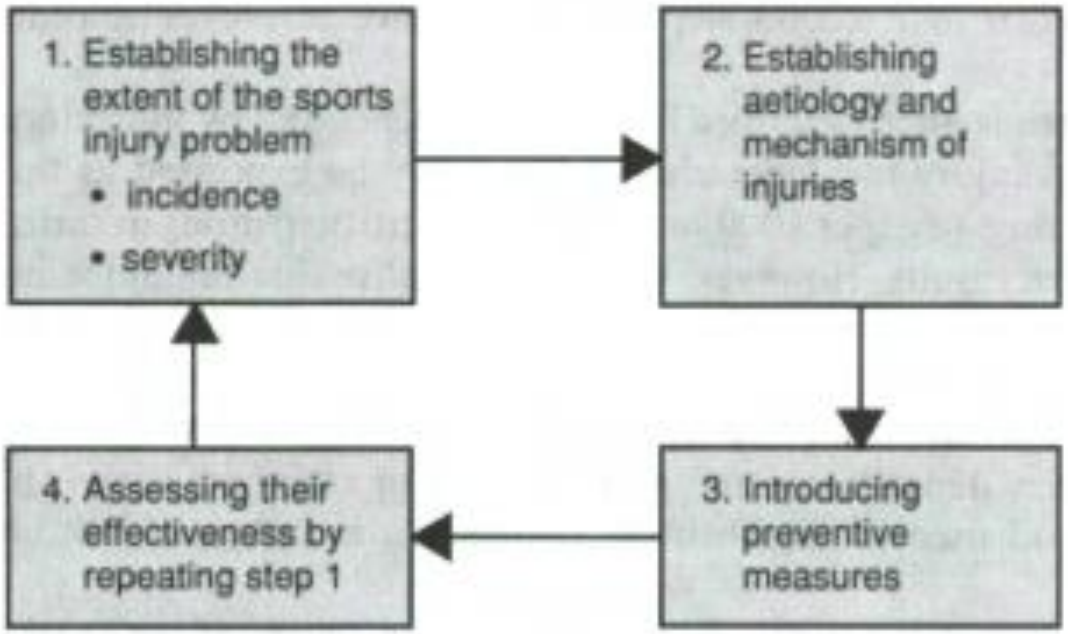
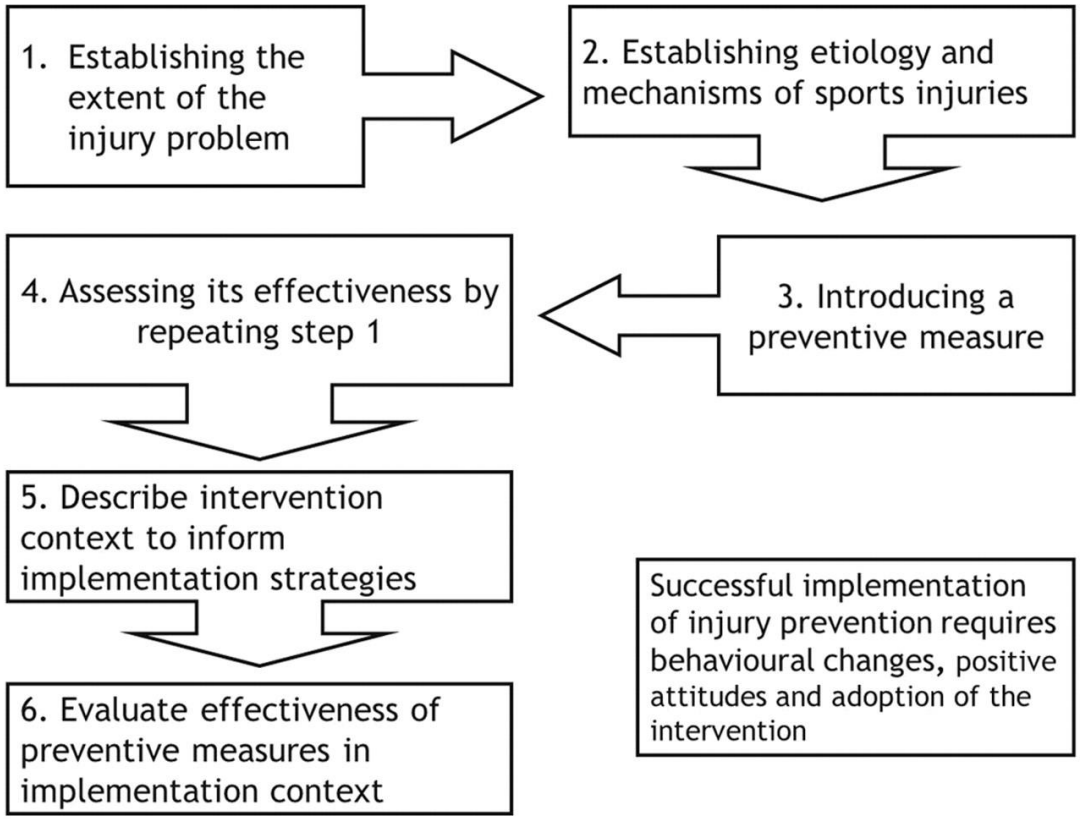


Fig. 1. The 'sequence of prevention' of sports injuries (van Mechelen et al. 1987).

Researching injuries

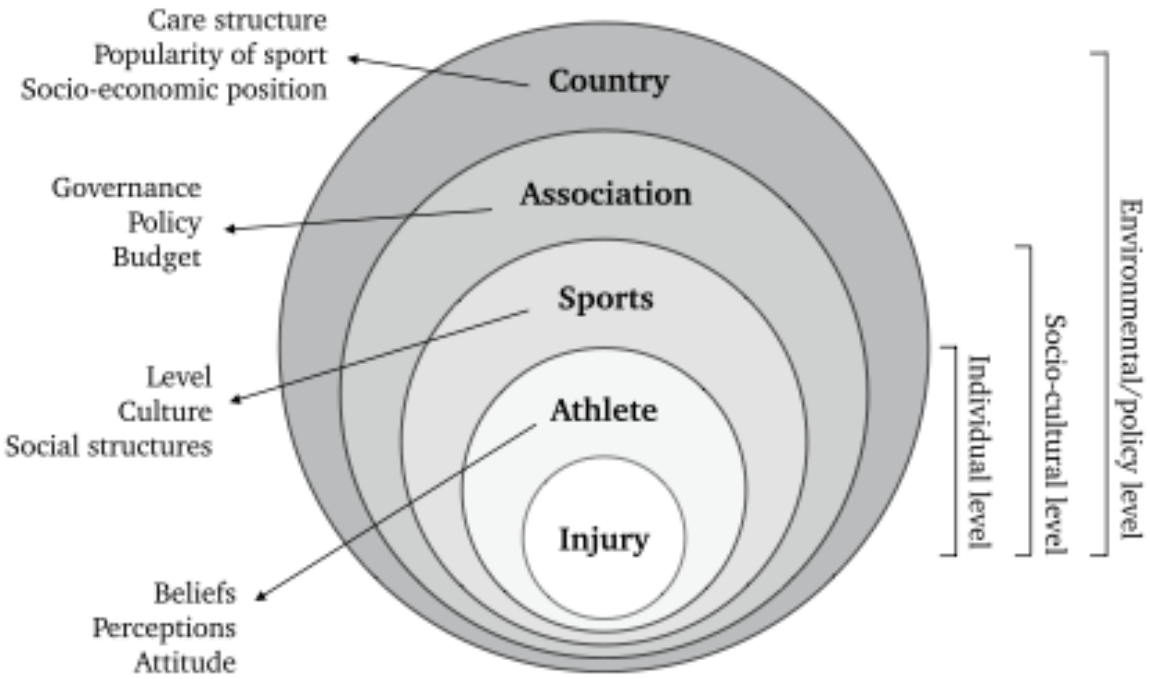
2006 –

Translating research into Injury prevention practice (TRIPP)



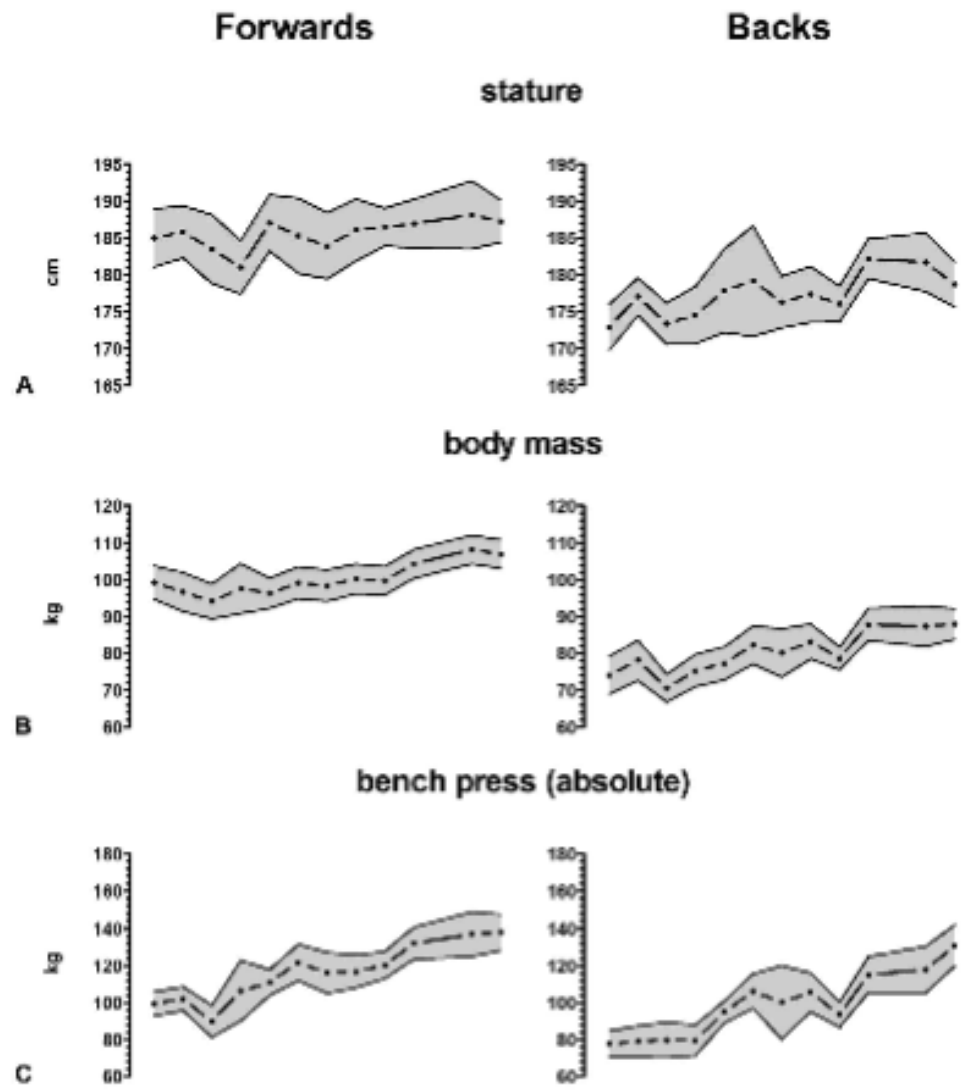
Current research approaches produce **singular solutions** to be adopted in all contexts

Problem 1: Injury contexts are unique, and not interchangable



A socioecological framework for sports injuries – Bolling et al., Sports Medicine, 2018

Problem 2: Injury contexts are dynamic, constantly changing



20% increase in body mass and strength of rugby players in 12 years

Lombard et al., JSCR, 2015

High speed running increased by **30%** in 7 years in the English Premier League

Barnes et al., Int. J Sports Med. 2014

~~"What works?"~~

"What works in what context, and why?"

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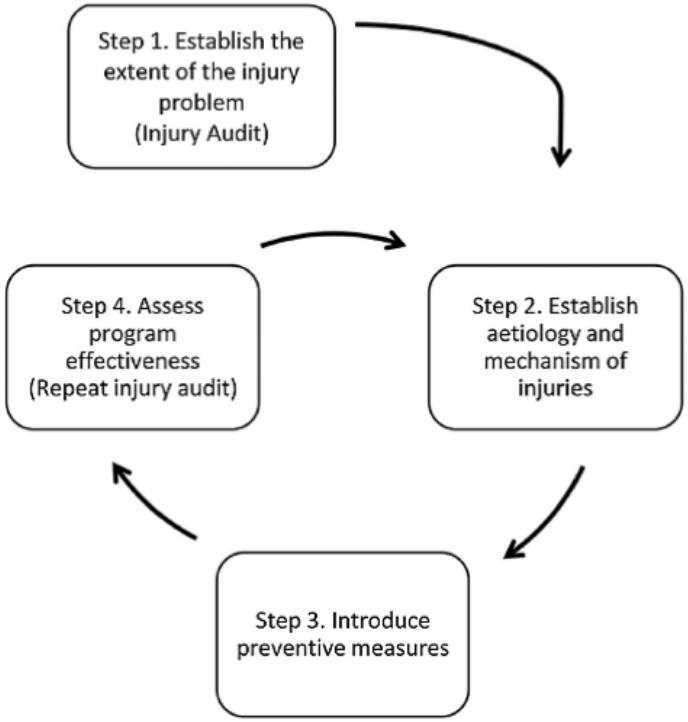
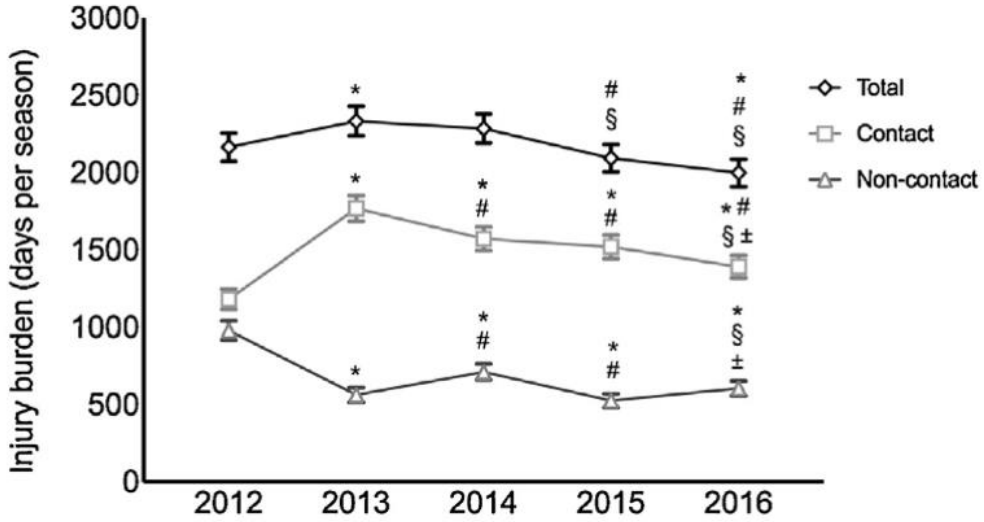
Solutions

- Better understanding of context – qualitative
- Ipsative
- Practitioner based
- Multi-site

Ipsative research





Tee et al., JSAMS, 2018

Ipsative research

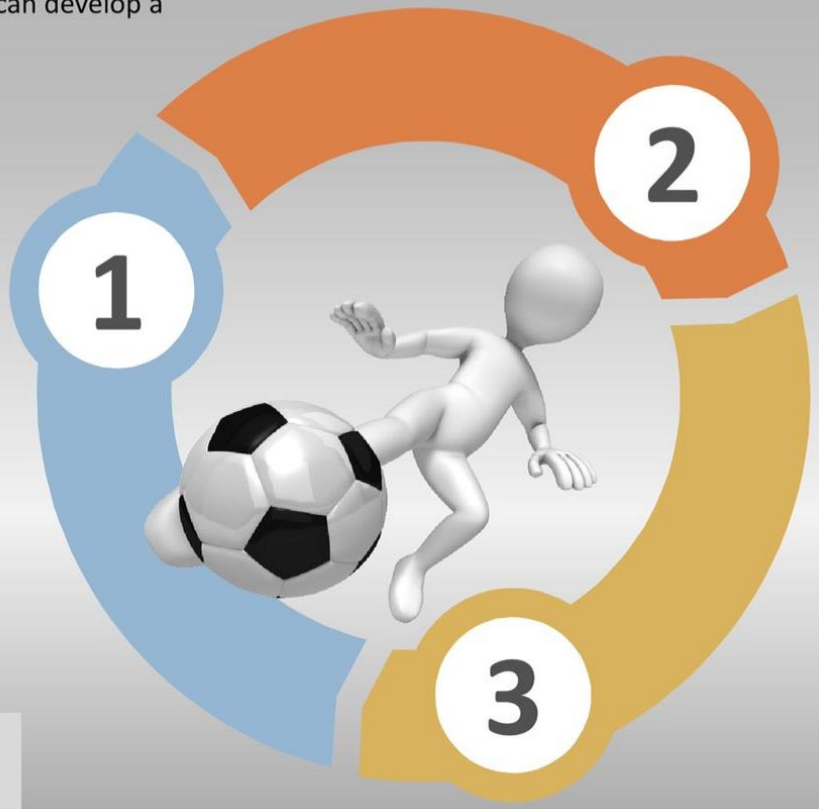
The Team-sport Injury Prevention (TIP) Cycle

The TIP Cycle was developed as part of the FC Barcelona Muscle Injury Guide 2018 and is specifically aimed at the sports team medicine/performance practitioner. By progressing through the 3 phases, teams can develop a dynamic, context-specific approach.

(Re)-EVALUATE

What is the current injury situation?

What is the injury prevention situation?



IDENTIFY

What are the injury risk factors and mechanisms?

What are the barriers & facilitators to delivering injury prevention?

INTERVENE

Plan the content and delivery of injury prevention strategie

Introduce injury prevention strategies

ien, Finch, Pruna & McCall 2018
nce & Medicine in Football
s://doi.org/10.1080/24733938.2018.1512752

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